



# Ecological Risk Assessment Support Center

February 2009

## FY 2008 Annual Report

National Center for Environmental Assessment  
Office of Research and Development  
U.S. Environmental Protection Agency  
Cincinnati, Ohio

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## **List of Acronyms**

AED	Atlantic Ecology Division
BSAF	Biota Sediment Accumulation Factor
EPA	Environmental Protection Agency
ERAF	Ecological Risk Assessment Forum
ERASC	Ecological Risk Assessment Support Center
ERD	External Review Draft
HOC	Hydrophobic Organic Contaminant
MED	Mid-Continent Ecology Division
NCEA	National Center for Environmental Assessment
NERL	National Exposure Research Laboratory
NHEERL	National Health and Environmental Effects Research Laboratory
NRMRL	National Risk Management Research Laboratory
OAR	Office of Air and Radiation
OPPTS	Office of Prevention, Pesticides, and Toxic Substances
ORD	Office of Research and Development
OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
RCRA	Resource Conservation and Recovery Act
RTP	Research Triangle Park
SERAFM	Spreadsheet-based Ecological Risk Assessment for the Fate of Mercury
WED	Western Ecology Division

## **Acknowledgments**

The Ecological Risk Assessment Support Center (ERASC) staff acknowledges the following individuals for their support in the development and peer review of technical responses during FY 2008.

### **U.S. Environmental Protection Agency (EPA), Office of Research and Development (ORD)**

National Center for Environmental Assessment (NCEA): David Farrar, Keith Sappington, Glenn Suter, Jeff Swartout

National Exposure Research Laboratory (NERL): Bob Ambrose, Craig Barber, Chris Knightes

National Health and Environmental Effects Research Laboratory (NHEERL):  
Jill Awkerman, Mace Barron, Richard Bennett, Walter Berry, Warren Boothman, Robert Burgess, Lawrence Burkhard, Anne Fairbrother (currently at Exponent), Steve Ferraro, Dale Hoff, Robert Ozretich

National Risk Management Research Laboratory (NRMRL): Carl Enfield (retired), Robert Ford, Bob Lien

### **EPA, Office of Prevention, Pesticides and Toxic Substances**

Office of Pesticide Programs: Christopher Salice, Ingrid Sunzenauer

### **EPA, Office of Solid Waste and Emergency Response**

Office of Superfund Remediation and Technology Innovation: Marc Greenberg

### **EPA Regions**

Cornell Rosiu, Region 1  
Gina Ferreira, Region 2  
Bruce Pluta, Region 3  
Sharon Thoms, Region 4  
Kay Wischkaemper, Region 4  
James Chapman, Region 5  
Venessa Madden, Region 7  
Steve Wharton, Region 8  
Bruce Duncan, Region 10  
Rene Fuentes, Region 10

**National Oceanographic and Atmospheric Administration**

Peter Landrum

**U.S. Army Engineer Research and Development Center**

Joan Clarke

**Consultants**

Susan Kane Driscoll, Exponent; David Glaser, Quantitative Environmental Analysis;  
Charles Menzie, Exponent; Michael Newman, Virginia Institute of Marine Science,  
School of Marine Science, The College of William and Mary; Roman Lanno, Ohio State  
University; Dominic DiToro, University of Delaware

# Overview of Ecological Risk Assessment Support Center

## Background/Purpose

The Ecological Risk Assessment Support Center (ERASC) provides technical information and addresses scientific questions on topics relevant to ecological risk assessment at hazardous waste sites for U.S. EPA's Office of Solid Waste and Emergency Response (OSWER) and Regional Superfund/Resource Conservation and Recovery Act (RCRA) staff. The topics are submitted by users in the program office and regions and channeled to ERASC through the Ecological Risk Assessment Forum (ERAF).<sup>1</sup> Current ERAF members are listed in the Appendix. To assess emerging and complex scientific issues that require expert judgment, the ERASC relies on the expertise of scientists and engineers located throughout Office of Research and Development (ORD) laboratories and centers. ERASC develops responses that reflect the "state of the science" for ecological risk assessment and provides a communication point for the distribution of the responses to interested parties.

The ERASC pilot program was initiated on November 6, 2000 through a Memorandum of Understanding between ORD and OSWER. Following the successful review and evaluation of the pilot program on February 7, 2002, the ERASC was established as a full program. The ERASC is managed by ORD's National Center for Environmental Assessment (NCEA) and is located in Cincinnati, Ohio.

The process for addressing technical requests is shown in Figure 1. ERASC Final documents and External Review Drafts can be found at the following website: <http://www.epa.gov/ERASC>.

## Activities

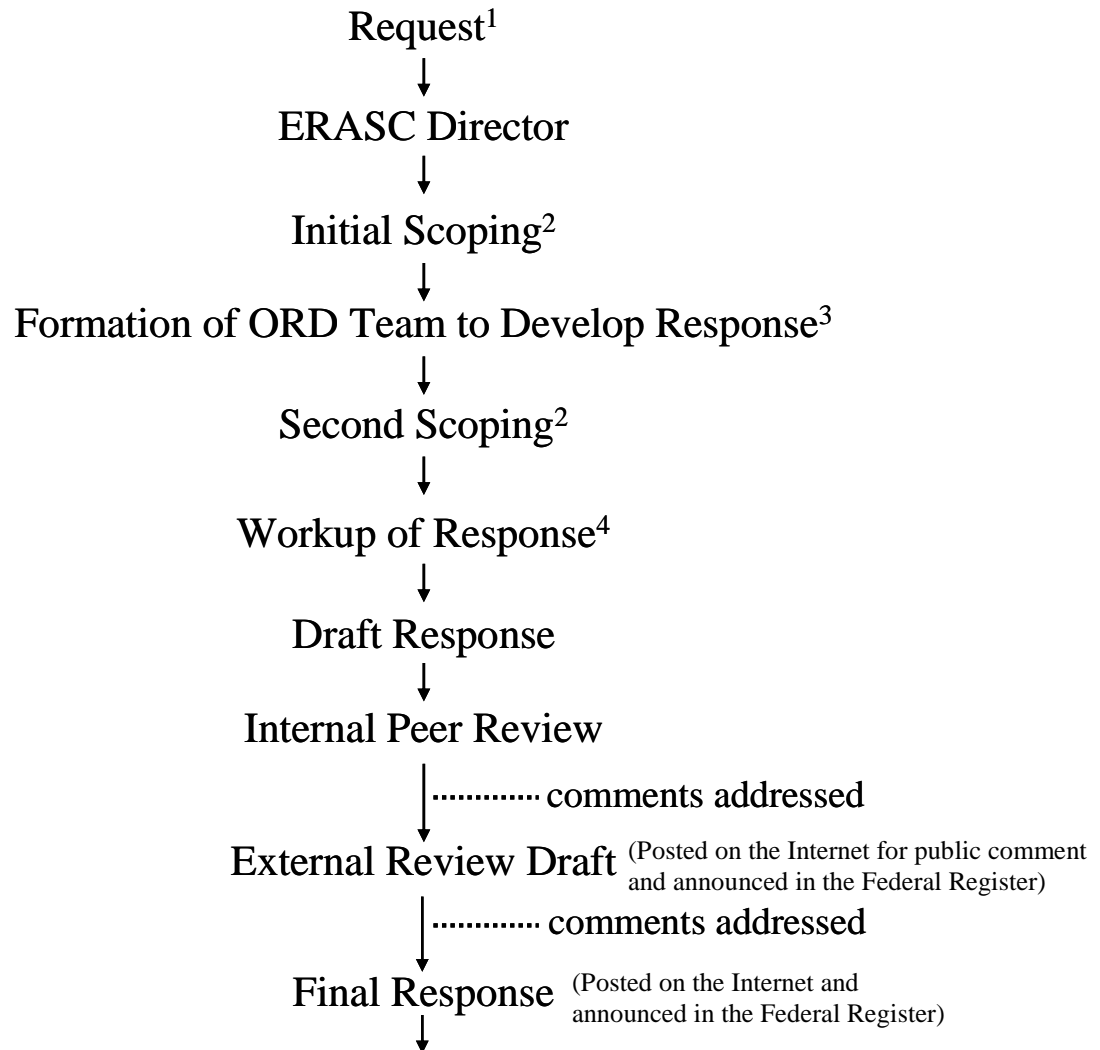
ERASC draws on the expertise of the Agency's laboratories and research centers as well as the scientific community to develop or assist in the development, interpretation and/or application of information in areas such as the following:

- Tools/methods to integrate characterizations of exposure and effects of chemicals
- Methods/models to evaluate relative and cumulative ecological risks of chemical, physical and biological stressors
- Dose-response information for ecological risk assessments
- Toxicity testing methods
- Bioavailability of chemicals in different media
- Bioaccumulation studies for fish and other wildlife

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<sup>1</sup> A group of Regional and Headquarters risk assessors that addresses ecological issues pertaining to hazardous waste sites.

**Figure 1**  
ERASC Process for Addressing Technical Requests



<sup>1</sup> Requests originate with ERAF members and are approved by the ERAF Tri-chairs.

<sup>2</sup> Initial scoping is by the requestor, ERASC Director and an ERAF Tri-chair. Second scoping is by the requestor, ERASC Director, ERAF Tri-chair and ORD team developing the response. The purpose of scoping is to ensure concurrence between the requestor and ORD team regarding response content and timeframe.

<sup>3</sup> ERASC Director will identify person(s) to develop response with approval of ORD senior management.

<sup>4</sup> ERASC Director will meet as necessary with requestor and ORD team throughout workup of response. Status updates will be available on the ERASC Discussion Database and presented during the ERAF monthly conference calls.



- Indices of community structure and function
- Methods for estimating short and long-term risks of various remedial options
- Monitoring protocols for assessing ecological effects
- Ecological screening levels
- Predictive models for determining population-level effects
- Biomarkers of effects
- Sampling and analysis methods

## Resources

ORD has committed one FTE (Full-Time Equivalent) for coordinating and administering the activities of the Center. The Center is managed by ORD's NCEA in Cincinnati, Ohio with Michael Kravitz as Director. Teresa Shannon serves as the Administrator (replacing Pat Daunt). Scientists from laboratories and centers across ORD provide their expertise as needed.

The ERASC is supported by ECFlex, Inc. under EPA Contract EP-C-06-088. Funding for ECFlex and external peer review in FY 2008 was provided by OSWER and ORD as shown below.

<b>Funds Expended by OSWER and ORD on ERASC in FY 2007</b>		
<b>Activity</b>	<b>OSWER</b>	<b>ORD</b>
Center Contract Support	\$40,000	---
External Peer Review of ERASC documents	\$10,538	\$12,252
Total from OSWER and ORD	\$50,538	\$12,252

## Accomplishments

Through FY 2008, the Center has received 19 requests, 2 of which have been cancelled. Responses to 10 requests are Final or available to the public as External Review Drafts. Three External Review Drafts were worked on in FY 2008, with final publication expected in the 2<sup>nd</sup> Quarter of FY 2009. Other documents are in various stages of development (see *ERASC Request Summary, FY 2008* [p. 5-8 of this report] for more detail). Accomplishments in FY 2008 include the following:

- A new post-doctorate, Hunter Anderson, was brought on board to assist in developing and authoring ERASC responses.
- Reviewed ERASC documents are posted on the Internet, where they are expected to impact a wide audience.

- External review and peer review comments were addressed for the response to Request 011 (*What is the approach for evaluating ecological risks to invertebrate receptors from PAHs in sediments at hazardous waste sites?*). A draft Final document was prepared and is expected to be posted (as Final)—at <http://www.epa.gov/ERASC> and on OSWER's risk assessment Internet site, [http://www.epa.gov/oswer/riskassessment/superfund\\_stressor.htm](http://www.epa.gov/oswer/riskassessment/superfund_stressor.htm)—by the 2nd Quarter of FY 2009.
- A draft Final document was prepared in response to Request 013 (*What is the most appropriate method to estimate the Biota Sediment Accumulation Factor [BSAF] from paired observations of chemical concentrations in biota and sediment?*). It is expected to be posted (as Final) at <http://www.epa.gov/ERASC> and on OSWER's risk assessment Internet site, [http://www.epa.gov/oswer/riskassessment/superfund\\_stressor.htm](http://www.epa.gov/oswer/riskassessment/superfund_stressor.htm)—by the 2nd Quarter of FY 2009.
- We completed a review of the EcoUpdate, *Ecological Toxicity Profiles: Development and Use in Ecological Risk Assessments*.
- Databases to facilitate the process of categorizing information and responding to requests were updated.
- The ERASC LotusNotes Discussion Database, established to facilitate communication among ERASC staff, the ERAF and the Steering Committee,<sup>2</sup> was updated to reflect new information. Access to this discussion database is at the discretion of the Director and limited to U.S. EPA staff and its relevant contractors. The following are currently available for comment on the ERASC Discussion Database: all requests received to date by ERASC, completed responses or status updates for all requests, important ERASC documents (e.g., electronic copy of the Memorandum of Understanding, list of ERASC contacts) and other relevant technical documents.

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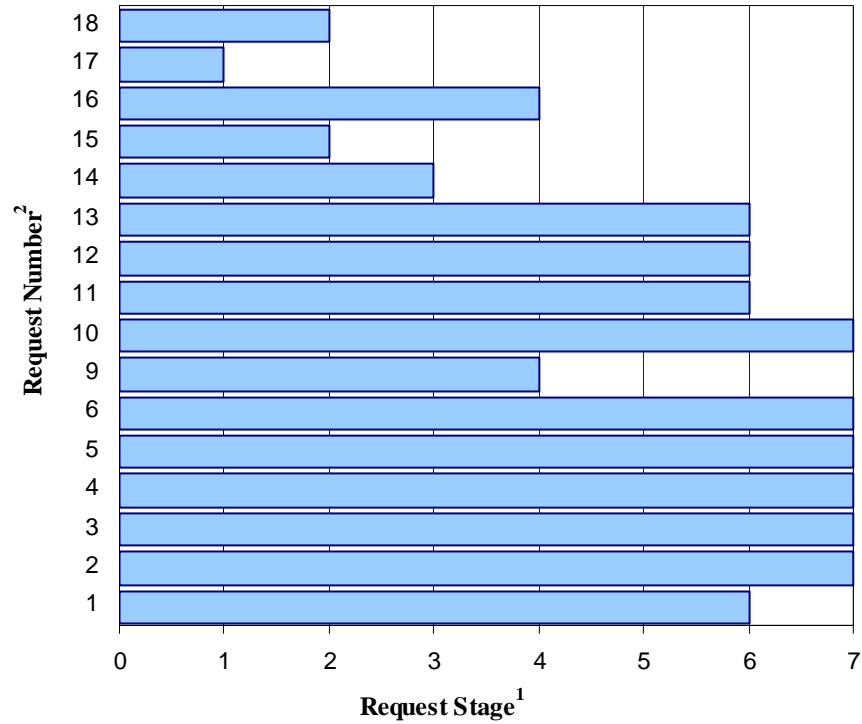
<sup>2</sup> A group consisting of members from ORD, OSWER and the ERAF tri-chairs that provides guidance to the Center.

## ERASC Request Summary

Figure 2 below depicts the status of all ERASC requests received to date. See Figure 3 for a Regional breakdown of the origin of ERASC requests received to date.

**Figure 2**

### Status of ERASC Requests Received to Date



<sup>1</sup>Stage 1 = Request Submitted

Stage 2 = ORD Team Formed to Develop Response

Stage 3 = Draft Response Completed (on ERASC Discussion Database)

Stage 4 = Internal Peer Review Completed

Stage 5 = External Review Draft Completed

Stage 6 = External Peer Review Completed

Stage 7 = Final Document Completed

<sup>2</sup>Requests 7 and 8 were cancelled. An additional request (Number 19) is a document review (completed) that did not go through the standard request stages.

## ERASC Request Summary—FY 2008 Only

### *Requests Completed or Near Completion (have undergone external peer review)*

<b>Request No. 010:</b>	<b>How can we develop a remediation goal for mercury in sediment when the concentration of mercury in sediment may be a poor predictor of mercury exposure to biota?</b>
<b>Report Title:</b>	Development of an Ecological Risk Assessment Methodology for Assessing Wildlife Exposure Risk Associated with Mercury-Contaminated Sediments in Lake and River Systems. Part 1: Essential Data Requirements. Part 2: SERAFM - - Spreadsheet-based Ecological Risk Assessment for the Fate of Mercury (A Screening Model)
<b>Technical Leads:</b>	Chris Knightes, ORD/NERL-ERD Bob Ambrose, ORD/NERL-ERD
<b>Status:</b>	Completed; document available for download from EPA Downloadable Publications page, ( <a href="http://www.epa.gov/athens/publications/downloadable.html">http://www.epa.gov/athens/publications/downloadable.html</a> ), and will also be posted at <a href="http://www.epa.gov/ERASC">http://www.epa.gov/ERASC</a> .
<hr/>	
<b>Request No. 011:</b>	<b>What is the approach for evaluating the ecological risk to invertebrate receptors from PAHs in sediments at hazardous waste sites?</b>
<b>Report Title:</b>	Evaluating Ecological Risk to Invertebrate Receptors from PAHs in Sediments at Hazardous Waste Sites
<b>Technical Lead:</b>	Robert Burgess, ORD/NHEERL-AED
<b>Status:</b>	External Review Draft (ERD) completed January 2007; available for download at ERASC website, <a href="http://www.epa.gov/ERASC">http://www.epa.gov/ERASC</a> . A draft Final document was prepared and is undergoing NCEA clearance. It will be posted (as Final) on OSWER and ERASC Internet sites.
<b>Expected Completion Date (Final):</b>	March 2009
<hr/>	
<b>Request No. 012:</b>	<b>What is the approach for evaluating ecological risks to invertebrate receptors from PAHs in soils? (Application of EqP theory to soil PAH contamination)</b>
<b>Report Title:</b>	Application of EqP Theory to Soil PAH Contamination

**Technical Lead:** Anne Fairbrother, ORD/NHEERL-WED (currently at Exponent)

**Status:** External review draft completed April 2006; available for download at ERASC website, <http://www.epa.gov/ERASC>. Minor edits to the draft Final document were required during NCEA clearance. It will be posted (as Final) on OSWER and ERASC Internet sites.

**Expected Completion**  
**Date (Final):** March 2009

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**Request No. 013:** **What is the most appropriate method to estimate the Biota Sediment Accumulation Factor (BSAF) from paired observations of chemical concentrations in biota and sediment?**

**Report Title:** Estimation of Biota Sediment Accumulation Factor (BSAF) from Paired Observations of Chemical Concentrations in Biota and Sediment

**Technical Lead:** Lawrence Burkhard, ORD/NHEERL-MED

**Status:** External review draft completed May 2006; available for download at ERASC website, <http://www.epa.gov/ERASC>. A draft Final document was prepared and is undergoing NCEA clearance. It will be posted (as Final) on OSWER and ERASC Internet sites.

**Expected Completion**  
**Date (Final):** February 2009

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**Request No. 001:** **Does dredging result in increased environmental risks to aquatic receptors?**

**Report Title:** Characterizing the Ecological Risks of Dredging Contaminated Sediments

**Technical Leads:** Mike Kravitz, ORD/NCEA-Cin  
Dennis Timberlake, ORD/NRMRL-Cin

**Status:** Near completion (response has been revised in accordance with external peer review comments)

**Expected Completion**  
**Date (Final):** May 2009

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## *Drafts in Process*

**Request No. 009:**      **What are the mechanisms that may transport hydrophobic organic contaminants (HOCs) to groundwater and downgradient media, and how will these mechanisms affect exposures, bioaccumulation and toxic effects on ecological receptors?**

**Report Title:**        Hydrophobic Organic Contaminant (HOC) Transport Mechanisms in Groundwater and Downgradient Surface Waters, and Estimation of Bioaccumulation and Ecological Risk

**Technical Leads:**     Carl Enfield, ORD/NRMRL-Cin (retired)  
Craig Barber, ORD/NERL-Athens

**Status:**                Internal review completed; additional information to be provided on data that should be collected to determine the most likely transport mechanism at a particular site; other revisions also necessary. Primary author (Enfield) retired and is unable to revise the document; a substitute expert is being sought.

**Expected Completion**  
**Dates (ERD):**         May 2009  
                              **(Final):**             January 2010

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**Request No. 014:**      **Which of the many sequential extraction procedures (SEP) are best at providing estimates of bioavailability?**

**Report Title:**        Use of Sequential Extraction Procedures to Assess Bioavailability of Metals in Soils and Sediments

**Technical Lead:**      Warren Boothman, ORD/NHEERL-AED

**Status:**                First draft revised and soon to be distributed for internal review.

**Expected Completion**  
**Dates (ERD):**         May 2009  
                              **(Final):**             January 2010

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**Request No. 015:**      **What is a scientifically defensible definition for the depth of the biotic zone in soils and sediments?**

**Technical Lead:**      Mike Kravitz, ORD/NCEA-Cin

**Status:**                We are reviewing the literature and developing an outline for the document.

**Expected Completion**

**Dates (ERD):** June 2009  
**(Final):** February 2010

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**Request No. 016:** **Evaluate the effectiveness and utility of the European Plant Protection Organization Protocol for estimating the degree of exposure to contaminants in soil to songbirds.**

**Report Title:** Assessment of Methods for Estimating Avian Exposure to Contaminated Particles in Soil (includes a *revised model for estimating the probability of ingesting n lead particles by birds*)

**Technical Lead:** Richard Bennett, ORD/NHEERL-MED  
Dale Hoff, ORD/NHEERL-MED

**Status:** Internal review comments were addressed; one of the ERAF Tri-chairs raised an additional issue that is currently being addressed. This has taken longer than expected due to the temporary unavailability of the primary author.

**Expected Completion**

**Dates (ERD):** May 2009  
**(Final):** January 2010

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**Request No. 017:** **What is the appropriate use of allometric scaling in ecological risk assessments?**

**Technical Lead:** To be determined.

**Status:** This request is in the process of being revised to address toxicity as well as exposure endpoints

**Expected Completion**

**Date (ERD):** To be determined

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**Request No. 018:** **Geochemical Evaluations—Statistics or No Statistics?**

**Technical Lead:** Hunter Anderson, ORD/NCEA-Cin

**Report Title:** Separating Metals Contamination from Background: Geochemical Evaluations

**Status:** A draft containing two of three sections has been posted to the ERASC Discussion Database.

**Expected Completion**

**Dates (ERD):** July 2009  
**(Final):** March 2010

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**Request No. 019:** **Review of final draft of the ECO Update, *Ecological Toxicity Profiles: Development and Use in Ecological Risk Assessments*.**

**Technical Lead:** Hunter Anderson, ORD/NCEA-Cin

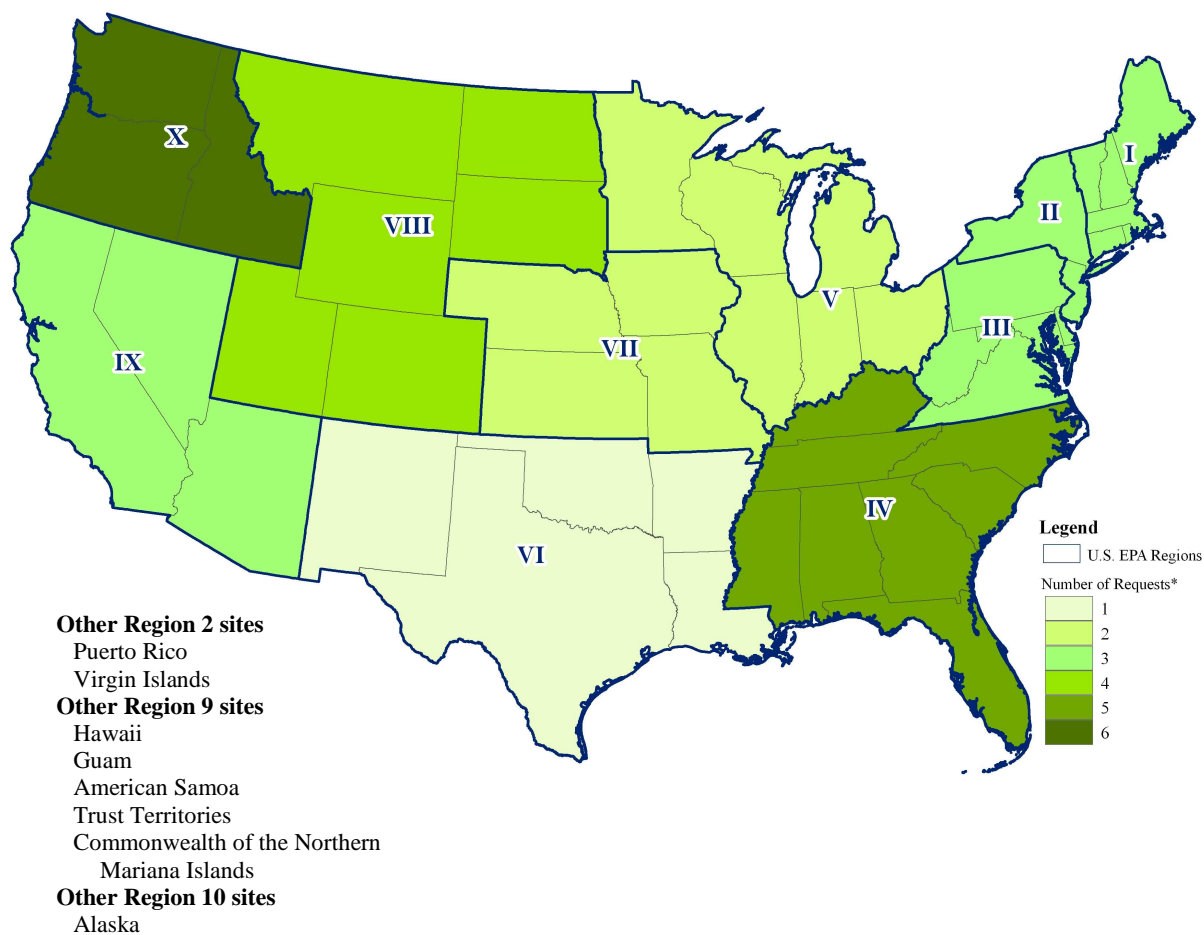
**Status:** Completed (only available to those within EPA).

**Completion Date:** December 2008

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**Figure 3**  
**Origin of ERASC Requests (17) Received to Date**



\* Total is more than 17 because several Regions may endorse a single request.

## Plans for FY 2009 and Beyond

ERASC continues to provide responses to requests from OSWER and the Regions that span a broad range of issues (see table below) and are disseminated to a wide audience through the Internet. Though we provide reviews of scientific documents and other technical assistance, the core of our work will continue to be the development of white papers that address issues regarding the interpretation of ecological data. We are encouraged that a number of recent requests have been co-sponsored by more than one Region. Several new requests are in discussion among the members of the ERAF. We will continue to address them to the best of our ability, and complete those that are outstanding.

Issues Covered by ERASC Requests	
Issue	Number of Requests*
Allometric Scaling in Risk Assessment	1
Equilibrium Partitioning	2
Population-Level Effects	1
Remediation	4
Ecological Risk from Specific Chemical Groups	
Polychlorinated Biphenyls (PCBs)	2
Polycyclic Aromatic Hydrocarbons (PAHs)	2
Hg	1
Pesticides	1
Metals	1
Bioaccumulation/Trophic Transfer	1
Geochemical Evaluations	1
Groundwater Contamination	1
Methods/Models	8
Scientific Document Review	1

\*A single request may address multiple issues, so may be listed more than once.

## **Appendix**

### **U.S. EPA Ecological Risk Assessment Forum (ERAF) Members**

Doug Ammon, OSWER, Washington, DC, 703-347-8925

Hunter Anderson, ORD, Cincinnati, OH, 513-569-7363

John Beach, Region 9, San Francisco, CA, 415-972-3347

Ned Black, Region 9, San Francisco, CA, 415-972-3055

David Brauner, Region 5, Chicago, IL, 312-886-1526

Carolyn Bury, Region 5, Chicago, IL, 312-886-3020

Valentina Cabrera-Stagno, Region 9, San Francisco, CA, 415-972-3434

James Chapman, Region 5, Chicago, IL, 312-886-7195

David Charters, OSWER, Edison, NJ, 732-906-6825

Michael Clemetson, Region 2, Edison, NJ, 732-321-6712

David E. Cooper, OSWER, Washington, DC, 703-603-8763

David Cozzie, OAR, RTP, NC, 919-541-5356

Dave Crawford, OSWER, Washington, DC, 703-603-8891

Jace Cuje, ORD, Washington, DC, 202-564-1795

Katie Davis, Region 3, Philadelphia, PA, 215-814-3558

Rebecca Derr, Region 10, Seattle, WA, 206-553-6389

Jennifer Dodds, Region 5, Chicago, IL, 312-886-1484

Bruce Duncan, Region 10, Seattle, WA, 206-553-0218

Steve Ells, OSWER, Washington, DC, 703-603-8822

Gina Ferreira, Region 2, Edison, NJ, 212-637-3768

Stiven Foster, OSWER, Washington, DC, 202-566-1911

Linda George, Region 4, Athens, GA, 706-355-8718

Joe Goulet, Region 10, Seattle, WA, 206-553-6692

Richard V. Graham, Region 8, Denver, CO, 303-312-7080

Marc Greenberg, OSWER, Edison, NJ, 732-452-6413

Karl Gustavson, OSWER, Washington, DC, 703-603-8753

Dale Haroski, OA, Washington, DC, 202-564-7338

Tala Henry, OPPTS, Washington, DC, 202-564-2959

Dale Hoff, ORD, Duluth, MN, 218-529-5386

Bart Hoskins, Region 1, Boston, MA, 617-918-8375

Joseph Hudek, Region 2, Edison, NJ, 732-321-6713

Brenda Jones, Region 5, Chicago, IL, 312-886-7188

Kristen Keteles, Region 8, Denver, CO, 303-312-6039

Michael Kravitz, ORD, Cincinnati, OH, 513-569-7740

Carlos Lago, OSWER, Washington, DC, 703-308-8642

Bobby Lewis, Region 4, Atlanta, GA, 706-355-8629

Venessa Madden, Region 7, Kansas City, KS, 913-551-7794

Charles Maurice, ORD, Region 5, Chicago, IL, 312-886-6635

Barbara Mazur, Region 5, Chicago, IL, 312-886-1491

Daniel Mazur, Region 5, Chicago, IL, 312-353-7997

Dave McDonald, Region 1, Boston, MA, 617-918-8609

Jayne Michaud, OSWER, Washington, DC, 703-603-8847

LaToya Miller, Region 4, Atlanta, GA, 404-562-9885

Alie Muneer, Region 5, Chicago, IL, 312-886-8031

Amy Mysz, Region 5, Chicago, IL, 312-886-0224

Charles Nace, Region 2, Edison, NJ, 212-637-4164

William Nelson, ORD, Narragansett, RI, 401-782-3053

Cheryl Overstreet, Region 6, Dallas, TX, 214-665-6643

Mindy Pensak, Region 2, Edison, NJ, 732-321-6705

Robert Pepin, Region 5, Chicago, IL, 312-886-1505

Bruce Pluta, Region 3, Philadelphia, PA, 215-814-2380

Ruth Prince, Region 3, Philadelphia, PA, 215-814-3118

Clint Rachal, Region 6, Dallas, TX, 214-665-6474

Jon Rauscher, Region 6, Dallas, TX, 214-665-8513

David Riley, Region 6, Dallas, TX, 214-665-7298

Susan Roddy, Region 6, Dallas, TX, 214-665-8518

Cornell Rosiu, Region 1, Boston, MA, 617-918-1345

Keith Sappington, OPPTS, Washington, DC, 703-605-0581

Anne Sergeant, ORD, Washington, DC, 202-343-9661

Burt Shephard, Region 10, Seattle, WA, 206-553-6359

Deborah Sherer, OPPTS, Washington, DC, 202-564-8529

Kenneth Shewmake, Region 6, Dallas, TX, 214-665-3198

Mark Sprenger, OSWER, Edison, NJ, 732-906-6826

Rick Sugatt, Region 1, Boston, MA, 617-918-1415

Brett Thomas, Region 4, Atlanta, GA, 404-562-8751

Sharon Thoms, Region 4, Atlanta, GA, 404-562-8666

Philip Turner, Region 6, Dallas, TX, 215-665-2706

Jeffrey Tuttle, Region 3, Philadelphia, PA, 215-814-3236

Patti Tyler, Region 8, Denver, CO, 303-312-6081

Sara Waterson, Region 4, Atlanta, GA, 404-562-9061

Steve Wharton, Region 8, Denver, CO, 303-312-6935

Catherine Wooster-Brown, Region 7, Kansas City, KS, 913-551-7425

Jeffrey Yurk, Region 6, Dallas, TX, 214-665-8309

Jean Zodrow, Region 10, Seattle, WA, 206-553-1302